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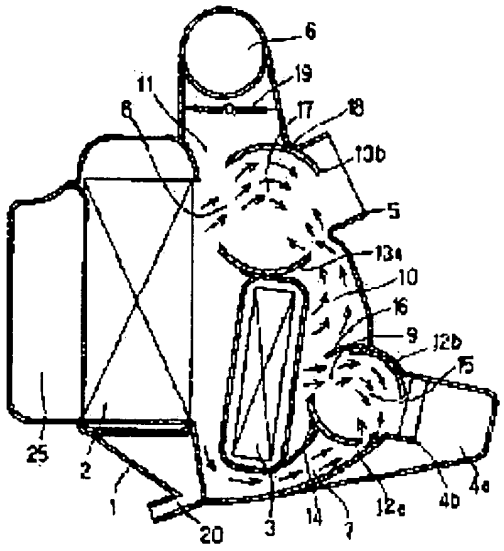
(54) CAR AIR CONDITIONER

(57)Abstract:
PURPOSE: To provide an airconditioner for car, which can blow a air consisting of well mixed cold wind and warm wind to the driver and passengers.
CONSTITUTION: No.1 rotary damper 12 is installed in No.1 air mix chamber 15 which is located at the intersection of No.1 cold wind passage 7 and No.1 warm wind passage 9. Now the heading of the warm wind having passed through the No.1 warm wind passage 9 is changed in compliance with the curvature of the No.1 rotary damper 12b, and this wam wind and a cold wind having passed through the No.1 cold wind passage 7 collide with each other within the No.1 air mix chamber 15 and mix thoroughly. No.2 rotary damper 13b is installed in No.2 air mix chamber 17 which is located at the intersection of No.2 cold wind passage 8 and No.2 warm wind passage 10. Now the heading of the cold wind having passed through the No.2 cold wind passage 6 is changed in compliance with the curvature of the No.2 rotary damper, and this cold wind and the warm wind having passed through the No.2 warm wind passage 10 collide with each other within the No.2 air mix chamber 17 and mix thoroughly.



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CLAIMS

[Claim(s)]
[Claim 1] The evaporator which cools the ventilated air, and the heater which heats said air, The cold blast path where the cold blast cooled with said evaporator bypasses and passes along said heater, The intersection which the warm air path along which the warm air heated by said heater passes, and said cold blast path and said warm air path intersect, A cold warm air rate accommodation means to adjust the rate of the amount of said cold blast which flows to this intersection, and the amount of said warm air, The outlet for blowing off said air with which it was formed in the lower stream of a river of said intersection, and the rate of the amount of said cold blast and the amount of warm air was adjusted to the vehicle interior of a room, It is prepared in said intersection, accomplish a curve configuration, and it rotates in this curve direction. The air conditioner for cars characterized by having the obstruction which guides either among said cold blast and said warm air so that said cold blast and said warm air may counter substantially, and controls the opening area of said outlet by said rotation.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the air conditioner for cars which adjusts the temperature of the air which ventilates the vehicle interior of a room.
[0002]
[Description of the Prior Art] The air conditioner for cars in the former was adjusting the amount of the cold blast which passes along an evaporator 2, and the amount of the warm air which passes along a heater 3 with the plate-like air mix damper, as shown in drawing 14 .
[0003]
[Problem(s) to be Solved by the Invention] When the amount of cold blast and the amount of warm air were adjusted with a plate-like air mix damper like before, as shown in drawing 14 , the cold blast and warm air after said accommodation turned to the air mix chamber 15 which is an intersection, and the direction mutual almost same within 17, and they were ventilated in the condition of having been divided into two-layer to the vehicle interior of a room, without fully mixing cold blast and warm air. Consequently, crew sensed warm air for the skin, or sensed cold air for the skin, and sensed offensively.
[0004] Then, this invention aims at offering the air conditioner for cars with which cold blast and warm air blow off the fully mixed air to crew.
[0005]
[Means for Solving the Problem] The evaporator which cools the ventilated air in order that this invention may attain the above-mentioned purpose, The cold blast path where the heater which heats said air, and the cold blast cooled with said evaporator bypass and pass along said heater, The intersection which the warm air path along which the warm air heated by said heater passes, and said cold blast path and said warm air path intersect, A cold warm air rate accommodation means to adjust the rate of the amount of said cold blast which flows to this intersection, and the amount of said warm air, The outlet for blowing off said air with which it was formed in the lower stream of a river of said intersection, and the rate of the amount of said cold blast and the amount of warm air was adjusted to the vehicle interior of a room, It is prepared in said intersection, accomplish a curve configuration, and it rotates in this curve direction. Either is guided among said cold blast and said warm air so that said cold blast and said warm air may counter substantially, and let the air conditioner for cars equipped with the obstruction which controls the opening area of said outlet by said rotation be the summary.
[0006]
[Function] In this invention, comparatively, the cold blast and warm air after passing an accommodation means collide with the obstruction of the coldness-and-warmth style with which each is carrying out the curve configuration, and each direction of subsequent counters mostly mutually. That is, since it is fully mixed by colliding mutually in the intersection which a cold blast path and a warm air path intersect, the both sides of cold blast and warm air lose its problem that crew senses warm air for the skin, or senses cold air for the skin, and becomes an unpleasant temper.
[0007] Moreover, the blowdown airflow from an outlet is adjusted by rotating this obstruction and controlling the opening area of an outlet by this invention. That is, it not only fully mixes cold blast and warm air, but the obstruction in this invention adjusts the blowdown airflow from an outlet.
[0008]
[Effect of the Invention] Since it has prevented that unevenness produces this invention to the temperature of the blow-off air to the vehicle interior of a room, crew can feel whenever [always comfortable vehicle room air

temperature]. Moreover, by this invention, it not only uses an obstruction for sufficient mixing with cold blast and warm air, but since it uses also for control of the opening area of an outlet, there is no need of establishing independently the obstruction for mixing with cold blast and warm air and the obstruction for control of the opening area of an outlet, and it leads to a cost cut.

[0009]

[Example] Hereafter, one example of this invention is explained according to drawing. Drawing 1 is the sectional view showing the configuration of the air-conditioner unit used by this invention. 1 is a case for containing an air-conditioner unit. 2 is an evaporator to which the refrigerant which got the interior cold flows, and cools the air which passes an evaporator 2. 20 is a drain water exhaust port for discharging the drain water generated on the front face of an evaporator 2 to vehicle outdoor. The engine cooling water which was able to be warmed with the heat of the engine which is not illustrated is the heater core which flows the interior, and 3 heats the air which passes the heater core 3.

[0010] The outlets 4, 5, and 6 for blowing off air are formed in each location of the vehicle interior of a room at the case 1. A vent outlet for a rear heat outlet for a front heat outlet for 4a to blow off air to the step of the crew who sits on a front seat, and 4b to blow off air to the step of the crew who sits on a backseat, and 5 to specifically blow off air to crew's upper half of the body, and 6 are the differential-gear outlets for blowing off air to a windshield.

[0011] 7 and 8 are the 1st cold blast paths and the 2nd cold blast paths where the cold blast cooled by the evaporator 2 bypasses and passes along the heater core 3. 9 and 10 are the 1st warm air paths and the 2nd warm air paths along which the warm air heated with the heater core 3 passes. 11 is a path for differential gears for passing the warm air heated with the cold blast and the heater core 3 which were cooled by the evaporator 2 toward the differential-gear outlet 6.

[0012] 12a and 12b which carried out the curve configuration are the 1st rotary dumper which shared the rotation shaft which was connected with the servo motor which is not illustrated, and which is not illustrated, and was arranged pivotable centering on the rotation shaft (refer to drawing 2). That is, 12a and 12b interlock.

[0013] 1st rotary dumper 12a rotates centering on a rotation shaft, always ****(ing) the part shown in 14 in drawing 1 , and adjusts the opening surface ratio of the 1st cold blast path 7 and the 1st warm air path 9. By adjusting this opening surface ratio, the amount of cold blast and the amount of warm air which flow into the 1st air mix chamber 15 which is the intersection of the 1st cold blast path 7 and the 1st warm air path 9 are adjusted, and six blow off from front heat outlet 4a and rear heat outlet 4b is adjusted.

[0014] 1st rotary dumper 12b rotates centering on a rotation shaft, always ****(ing) the part shown in 16 in drawing, and adjusts the opening area of front heat outlet 4a, and the opening area of rear heat outlet 4b. And the blow-off airflow from front heat outlet 4a and rear heat outlet 4b is adjusted.

[0015] When the 1st rotary dumper 12 is fixed to the location of arbitration and the cold blast and warm air into the 1st air mix chamber 15 are determined as the amount of arbitration, the warm air which flows in the 1st air mix chamber 15 changes the ventilation direction in accordance with the curve configuration of 1st rotary dumper 12b, and collides with the cold blast which flows in the 1st air mix chamber 15 through the 1st cold blast path 7 mutually. Consequently, cold blast and warm air are firmly mixed in the 1st air mix chamber 15, and the air by which temperature control was carried out certainly blows off to front heat outlet 4a and the rear heat outlet 4b empty vehicle interior of a room.

[0016] 13a and 13b which carried out the curve configuration are the 2nd rotary dumper which shared the rotation shaft which was connected with the servo motor which is not illustrated, and which is not illustrated, and was arranged pivotable centering on the rotation shaft (refer to drawing 2). That is, 13a and 13b interlock.

[0017] 2nd rotary dumper 13a rotates centering on a rotation shaft, always ****(ing) the drawing Nakagami end face of the heater core 3, and adjusts the opening surface ratio of the 2nd cold blast path 8 and the 2nd warm air path 10. By adjusting this opening surface ratio, the amount of cold blast and the amount of warm air which flow into the 2nd air mix chamber 17 which is the intersection of the 2nd cold blast path 8 and the 2nd warm air path 10 are adjusted, and whenever [from the vent outlet 5 / blow-off temperature] is adjusted.

[0018] 2nd rotary dumper 13b rotates centering on a rotation shaft, always ****(ing) the part shown in 18 in drawing, and adjusts the opening area of the vent outlet 5, and the opening area of the differential-gear outlet 6. And the blow-off airflow from the vent outlet 5 is adjusted. It is controlled by opening of the damper 19 for differential gears arranged in the path 11 for differential gears about the blow-off airflow from the differential-gear outlet 6.

[0019] When the 2nd rotary dumper 13 is fixed to the location of arbitration and the cold blast and warm air into the 2nd air mix chamber 17 are determined as the amount of arbitration, the cold blast which flows in the 2nd air mix chamber 17 changes the ventilation direction in accordance with the curve configuration of 2nd rotary dumper 13b, and collides with the warm air which flows in the 2nd air mix chamber 17 through the 2nd warm air path 10 mutually. Consequently, cold blast and warm air are firmly mixed in the 2nd air mix chamber 17, and the air by which temperature control was carried out certainly blows off to the vent outlet 5 empty-vehicle interior of a room.

[0020] Next, the configuration of the 1st rotary dumper 12 and the 2nd rotary dumper 13 is briefly explained using drawing 2 . In addition, both the 1st rotary dumper 12 and the 2nd rotary dumper 13 are the same configurations.

[0021] Drawing 2 (a) is the side elevation of the 1st rotary dumper 12, and drawing 2 (b) is an A-A view sectional view in drawing 2 (a). As shown in drawing 2 (a), the 1st rotary dumper 12 is formed when the contents which have a raised bottom and a lower base cut off the part which shows the cylinder of a cavity to 21 in drawing. That is, the ventilation of the part shown in 21 in drawing to a space perpendicular direction is attained.

[0022] The rotation shaft 24 is formed in the raised bottom 22 and the lower base 23, and makes the 1st rotary dumper 12 pivotable by supporting these two rotation shafts 24 in a case 1, respectively. And the servo motor (refer to drawing 3) which is not illustrated has connected with one rotation shaft 24, and when this servo motor rotates the rotation shaft 24, the 1st rotary dumper 12 is rotated.

[0023] Although only the air-conditioner unit was illustrated in drawing 1 , the blower unit for making this air-conditioner unit generate air is connected in the part shown in 25 of drawing 1 . Hereafter, a blower unit is simply explained using drawing 3 . Drawing 3 is the perspective view showing both units when an air-conditioner unit and a blower unit are united.

[0024] The left-hand side one half in drawing of drawing 3 is a blower unit, and right-hand side one half is an air-conditioner unit. In a blower unit, 26 is a bashful inlet for adopting the air of the vehicle interior of a room to a blower unit, and 27 is an open air inlet for adopting vehicle outdoor air to a blower unit. Control of whether air is adopted from the vehicle interior of a room or to take in from vehicle outdoor is performed by the inside-and-outside mind change damper which is not illustrated. 28 is a blower case which contains the blower for generating airstream, and 29 is some blower motors which drive a blower. And the airstream generated by the blower is ventilated by the part shown in 25 of drawing 1 through the free passage case 30, and is ventilated to the whole air-conditioner unit. Moreover, the 1st servo motor with which 31 in drawing drives the 1st rotary dumper 12, and the 2nd servo motor with which 32 drives the 2nd rotary dumper 13 are shown, and the drawing Nakaya mark shows the flow of air.

[0025] Next, the control system of this example is explained using drawing 4 . Drawing 4 is the block diagram having shown the control system of this example. The output signal Tsetl from the left-hand side temperature setter 37 for setting up whenever [output signal / from the right-hand side temperature setter 36 for setting up whenever / output signal / from the sun sensor 35 which detects the location of the output signal Tr from the bashful sensor 33 which detects the temperature of the vehicle interior of a room, the output signal Tam from the open air sensor 34 which detects vehicle outdoor temperature, and the sun, and the reinforcement of solar radiation / Ts, and room air temperature / of a driver's seat / Tsetr, and room air temperature / of a passenger seat] is altogether inputted to ECU38.

[0026] ECU38 consists of microcomputers of the common knowledge equipped with arithmetic and program control (CPU), ROM and RAM, and an input/output interface. And data processing is carried out according to the program and map which were beforehand decided based on each above-mentioned output signal, and the signal which controls the blower motor 29, the 1st servo motor 31, the 2nd servo motor 32, and the servo motor 41 that drives the inside-and-outside mind change damper which is not illustrated is outputted.

[0027] A microcomputer calculates [whenever / need blow-off temperature / of a driver's seat] TAOl whenever [TAOr and need blow-off temperature / of a passenger seat] based on each above-mentioned output signal with the formula decided beforehand as shown in the following formula 1 and a formula 2.

[0028]

[Equation 1]

TAOr=K1 *f(Tsetr, l)-K2 *Tr-K3 *Tam-K4 *Tsr+K5 [0029]

[Equation 2]

TAOl=TAOr-K1 *(Tsetr-Tsetl)+K4 *(Tsr-Tsl)

- T_{setr} : 運転席側設定温度
- T_{setl} : 運転席側設定温度
- T_r : 車室内温度
- T_{am} : 外気温度
- T_{sr} : 運転席側日射強度
- T_{sl} : 運転席側日射強度
- Kn : 定数 (n =1, 2, 3, 4, 5)

In the above-mentioned formula 1, f (Tsetr, l) expresses the function of Tsetr and Tsetl, for example, is good also as the average of Tsetr and Tsetl.

[0030] If TAOr and TAOl (henceforth [both sides are named generically and] TAO) are calculated with the above-mentioned formula 1 and a formula 2, it will ask for the applied voltage to the blower motor 29 in order to calculate the blow-off airflow of a blower according to the map shown in drawing 5 . Drawing 5 is a map in which the applied voltage to the blower motor 29 according to TAO is shown here.

[0031] A change control signal with the open air, the control signal to the 1st rotary dumper 12, and the control signal to the 2nd rotary dumper 13 are also searched for according to Above TAO as it is bashful.

[0032] Drawing 6 is the front view showing the air-conditioner panel used by this example. In drawing 6 , when 39 uses an air-conditioner not by auto but by the manual, it is a blower switch for adjusting blower blow-off airflow, if it turns to the circumference of an anti-clock from the location to illustrate, airflow will become small, and if it turns to the circumference of a clock, airflow will become large. It is a right-hand side vent switch for 40 to adjust whenever [blow-off temperature / of only the vent of a driver's seat], and, blow-off airflow, when blow-off mode is a bilevel mode, and if it turns to the circumference of an anti-clock from the location to illustrate, temperature will fall and airflow will increase. Moreover, if it turns to the circumference of a clock, temperature will become high and airflow will fall. It is a left-hand side vent switch for 41 to adjust whenever [blow-off temperature / of only the vent of a passenger seat], and, blow-off airflow, when blow-off mode is a bilevel mode, and if it turns to the circumference of an anti-clock from the location to illustrate, temperature will fall and airflow will increase. Moreover, if it turns to the circumference of a clock, temperature will become high and airflow will fall.

[0033] According to a Fig., it explains below what kind of actuation this example carries out in the configuration described above. In addition, the explanation given below omits the explanation about a passenger seat only about a driver's seat.

[0034] For example, as shown in the drawing 7 left, when the right-hand side vent switch 40 is set as the mid-position and whenever [room air temperature] is set as 16 degrees C by the right-hand side temperature setter 36, the 1st rotary dumper 12 and the 2nd rotary dumper 13 move to the location shown in the drawing 7 right. That is, all (henceforth [both sides are named generically and] the heat outlet 4) of front heat outlet 4a and rear heat outlet 4b intercept, and it becomes the vent mode in which the vent outlet 5 carries out opening altogether. Moreover, since the 2nd rotary dumper 13 is intercepting the 2nd warm air path 10 and the 2nd air mix chamber 17, whenever [blow-off temperature / which blows off from the vent outlet 5] is the lowest. Moreover, the damper 19 for differential gears is intercepting the differential-gear outlet 6 altogether.

[0035] Laying temperature is raised gradually, fixing the right-hand side vent switch 40 to the mid-position, and as shown in the drawing 8 left, when whenever [room air temperature] is set as 22 degrees C, the 1st rotary dumper 12 and the 2nd rotary dumper 13 move to the location shown in the drawing 8 right. That is, the 1st rotary dumper 12 is carrying out opening of the 1st cold blast path 7 and the 1st warm air path 9 so that abbreviation one half opening of the heat outlet 4 may be carried out and both cold blast and warm air may be incorporated into the 1st air mix chamber 15. Moreover, the 2nd rotary dumper 13 is carrying out opening of the 2nd cold blast path 8 and the 2nd warm air path 10 so that opening of the vent outlet 5 and the path 11 for differential gears may be carried out by abbreviation one half and both cold blast and warm air may be incorporated into the 2nd air mix chamber 17. Since the damper 19 for differential gears is carrying out opening of the differential-gear outlet 6 for a while at this time, air flows also from the differential-gear outlet 6 to the vehicle interior of a room for a while.

[0036] The laying temperature mountain is changed fixing the right-hand side vent switch 40 similarly, and as shown in the drawing 9 left, when whenever [room air temperature] is set as 28 degrees C, the 1st rotary

dumper 12 and the 2nd rotary dumper 13 move to the location shown in the drawing 9 right. That is, the heat outlet 4 carries out opening for all, and it becomes the heat mode which the vent outlet 5 intercepts altogether. Since the 1st cold blast path 7 and the 2nd cold blast path 8 are altogether intercepted by the 1st rotary dumper 12 and the 2nd rotary dumper 13, whenever [from the heat outlet 4 and the differential-gear outlet 6 / blow-off temperature] becomes the highest. At this time, the damper 19 for differential gears is carrying out opening of the differential-gear outlet 6 for a while.

[0037] While operating a car, when the mode is changed from auto to a differential gear, the 1st rotary dumper 12 and the 2nd rotary dumper 13 move to the location shown in the drawing 10 right like [when a windowpane blooms cloudy suddenly]. That is, the 1st rotary dumper 12 intercepts the heat outlet 4 altogether, and the 2nd rotary dumper 13 intercepts the vent outlet 5 altogether. And the damper 19 for differential gears carries out opening of the differential-gear outlet 6 altogether.

[0038] Moreover, it is made the configuration which can do the vertical independent temperature control other than a right-and-left independent temperature control in this example. If a driver senses sense of incongruity in the style of vent blow off when setting whenever [room air temperature] as 22 degrees C and having set the location of the right-hand side vent switch 40 as the mid-position by the right-hand side temperature setter 36, as shown in the drawing 11 left, this sense of incongruity is cancelable by adjusting the location of the right-hand side vent switch 40. Moreover, the drawing 11 right shows the location of the 1st rotary dumper 12 and the 2nd rotary dumper 13 when setting the right-hand side temperature setter 36 and the right-hand side vent switch 40 as the location of the drawing 11 left.

[0039] For example, what is necessary is just to rotate the right-hand side vent switch 40 to the circumference of an anti-clock, as shown in the drawing 12 left when the right-hand side temperature setter 36 and the right-hand side vent switch 40 are set up and a driver senses heat for the upper half of the body, as shown in the drawing 11 left. Then, as shown in the drawing 12 right, only the 2nd rotary dumper 13 rotates the 1st rotary dumper 12 to the circumference of an anti-clock to not moving. Consequently, the 2nd rotary dumper 13 carries out opening of the 2nd cold blast path 8 to intercepting the 2nd warm air path 10 gradually and coincidence gradually. and -- just -- being alike -- whenever [vent blow-off temperature] becomes the lowest. moreover, the opening area of the vent outlet 5 -- gradually -- large -- becoming -- just -- being alike -- vent blow-off airflow serves as max.

[0040] Since the right-hand side vent switch 40 turns whenever [vent blow-off temperature], and vent blow-off airflow and they can be controlled by the degree, according to the degree of the heat sensed for a driver's upper half of the body, the right-hand side vent switch 40 can turn, a degree can be adjusted, and the above-mentioned heat can be canceled.

[0041] What is necessary is on the other hand, just to rotate the right-hand side vent switch 40 to the circumference of a clock, as shown in the drawing 13 left when a driver senses a cold sense for the upper half of the body. Then, as shown in the drawing 13 right, only the 2nd rotary dumper 13 rotates the 1st rotary dumper 12 to the circumference of a clock to not moving. Consequently, the 2nd rotary dumper 13 intercepts the 2nd cold blast path 8 gradually to carrying out opening of the 2nd warm air path 10 gradually, and coincidence. and -- just -- being alike -- the temperature in the 2nd air mix chamber 17 serves as the highest. moreover, the 2nd rotary dumper 13 -- the vent outlet 5 -- gradually -- intercepting -- just -- being alike -- air stops blowing off from the vent outlet 5

[0042] Like the above-mentioned explanation, by turning the right-hand side vent switch 40 to the circumference of a clock, whenever [vent blow-off temperature] becomes high gradually, and vent blow-off airflow decreases gradually. So, the above-mentioned cold sense is cancelable by the right-hand side vent switch's 40 turning according to the cold sense sensed for a driver's upper half of the body, adjusting a degree, and lowering airflow to lowering whenever [vent blow-off temperature] and coincidence.

[0043] Since the 1st rotary dumper and the 2nd rotary dumper were constituted from a curve configuration in this example as explained in full detail above, cold blast and warm air can be firmly mixed within the 1st air mix chamber and the 2nd air mix chamber. Consequently, a blow-off wind does not become two-layer and crew can feel whenever [comfortable blow-off temperature].

[0044] Moreover, since 1st rotary dumper 12b which controls 1st rotary dumper 12a which performs an air mix operation, and outlet opening area by this example is driven with one servo motor, compared with driving 1st rotary dumper 12a and 1st rotary dumper 12b with a respectively different servo motor, it leads to a cost cut. Effectiveness with the same said of 2nd rotary dumper 13a and the 2nd rotary dumper 13b is acquired.

[0045] In addition, the evaporator 2 constitutes the evaporator in this invention from the above-mentioned example, and the heater consists of heater cores 3. Cold blast paths are the 1st cold blast path 7 and the 2nd cold blast path 8, and warm air paths are the 1st warm air path 9 and the 2nd warm air path 10. Intersections are the 1st air mix chamber 15 and the 2nd air mix chamber 17. Coldness-and-warmth wind rate accommodation means are 1st rotary dumper 12a and 1st rotary dumper 13a. Outlets are the heat outlet 4 and the vent outlet 5. Obstructions are 1st rotary dumper 12b and 2nd rotary dumper 13b.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the air conditioner for cars which adjusts the temperature of the air which ventilates the vehicle interior of a room.

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PRIOR ART

[Description of the Prior Art] The air conditioner for cars in the former was adjusting the amount of the cold blast which passes along an evaporator 2, and the amount of the warm air which passes along a heater 3 with the plate-like air mix damper, as shown in drawing 14 .

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EFFECT OF THE INVENTION

[Effect of the Invention] Since it has prevented that unevenness produces this invention to the temperature of the blow-off air to the vehicle interior of a room, crew can feel whenever [always comfortable vehicle room air temperature]. Moreover, by this invention, it not only uses an obstruction for sufficient mixing with cold blast and warm air, but since it uses also for control of the opening area of an outlet, there is no need of establishing independently the obstruction for mixing with cold blast and warm air and the obstruction for control of the opening area of an outlet, and it leads to a cost cut.

[Translation done.]